

Science brings  
nations together



## JOINT INSTITUTE FOR NUCLEAR RESEARCH

FLAGSHIP PROJECTS



DUBNA | 2025

[WWW.JINR.INT](http://WWW.JINR.INT)



## THE JOINT INSTITUTE FOR NUCLEAR RESEARCH

is an international intergovernmental organization, a world-famous scientific centre that integrates fundamental theoretical and experimental research with the development and application of advanced technology and university education.

There is a wide range of experimental facilities at JINR.

The megascience project to construct the NICA Superconducting Heavy Ion Collider.

JINR plays a significant role in implementing the megascience project to build the deep underwater Baikal-GVD Neutrino Telescope.

JINR scientists have discovered 10 new elements.

### RESEARCH DIRECTIONS

#### Theoretical Physics

#### Relativistic Heavy Ion Physics

#### Spin Physics

#### Particle Physics

#### Low Energy Nuclear Physics

#### Neutron Nuclear Physics

#### Condensed Matter Physics

#### Neutrino & Astroparticle Physics

Life  
sciences:

**Radiobiology**  
**Biomedicine**  
**Structural Biology**  
**Astrobiology**  
**Ecology**

#### IT & High-Performance Computing

#### Outreach & Education

**7 JINR Laboratories,  
each comparable  
in the research scale to  
a large academic institution**



Veksler and Baldin Laboratory  
of High Energy Physics



[lhep.jinr.ru](http://lhep.jinr.ru)



Dzhelepov Laboratory  
of Nuclear Problems



[dlnp.jinr.ru](http://dlnp.jinr.ru)



Bogoliubov Laboratory  
of Theoretical Physics



[theor.jinr.ru](http://theor.jinr.ru)



Frank Laboratory  
of Neutron Physics



[flnph.jinr.ru](http://flnph.jinr.ru)



Flerov Laboratory  
of Nuclear Reactions



[flerovlab.jinr.ru](http://flerovlab.jinr.ru)



Meshcheryakov Laboratory  
of Information Technologies



[lit.jinr.ru](http://lit.jinr.ru)



Laboratory  
of Radiation Biology



[lrb.jinr.ru](http://lrb.jinr.ru)



### Dear colleagues and friends,

The Joint Institute for Nuclear Research in Dubna is an integral part of a global family of unique international research centres. Our mission is to provide the highest quality of scientific agenda for cutting-edge research and discoveries aimed to understand the fundamental properties of matter.

The JINR Long-Term Development Strategic Plan up to 2030 and beyond is designed to strengthen our common international scientific family. The core research fields at JINR are low energy nuclear physics, relativistic heavy ion and spin physics, particle physics, neutrino and astroparticle physics, condensed matter and neutron nuclear physics, radiobiology and nuclear medicine, theoretical physics, information technologies and high-performance computing. The Institute is based on internationally recognised scientific schools. Development of the idea of neutrino oscillations, synthesis of new superheavy elements, ultracold neutrons, nuclear matter superfluidity, postradiation cell recovery, quantum field theory, harmonical superdimension in supersymmetry, a new generation of neutron pulsed reactors, and a hyperconverged heterogeneous computing cluster are just some of the notable scientific subjects associated with modern JINR.

Our Institute and its laboratories are also setting the agenda at the forefront of innovations. These frontiers include novel materials and energetics, biomedicine, quantum technologies, data science, etc.

JINR primarily focuses on basic science. Undoubtedly, the quality of our scientific output is determined by essential aspects reinforcing the Institute's status as a modern dynamic international scientific organization. These aspects are worldwide scientific cooperation, science diplomacy, favourable social environment, digitalisation, and innovation policy.

Our international team is diverse but united through the passion for research and sharing the value of international cooperation. The JINR Sofia Declaration signed in November 2021 highlights the value of international scientific and technological integration in solving the tasks of strengthening peace, fostering mutual understanding, and facilitating socio-economic progress of all the countries.

JINR is open to attracting new partners and even entire regional clusters: science brings nations together. We feel obligated to use our scientific and integrating potential to promote peaceful scientific and technological progress in different parts of our planet.

I hope this brochure inspires you to become a missionary of the Joint Institute. On behalf of the JINR team I wish you pleasant acquaintance with our international research centre.

Grigory Trubnikov  
JINR Director



**Seven-Year  
Plan for JINR  
Development  
(PDF)**



**JINR  
Development  
Strategy  
(PDF)**



ORGANIZATION

The Committee of Plenipotentiaries of the Governments of the JINR Member States (CP) is the supreme governing body of the Institute, making key decisions regarding the activities. The JINR Member States share the financing of the JINR activities and have equal rights in the management of the Institute. The Member States make contributions in the amount established by the Committee of Plenipotentiaries. The Finance Committee and the Scientific Council operate under the CP JINR.

The JINR research policy is determined by the Scientific Council. It consists of eminent researchers from world-leading academic organizations and universities.

The Programme Advisory Committees (PACs) are advisory bodies to the JINR Directorate and Scientific Council in three fields of study: particle, nuclear, and condensed matter physics. The PACs evaluate experimental projects proposed by scientific collaborations, institutes, JINR laboratories, and individual researchers.

The Science and Technology Council of the Institute is an advisory body to the JINR Directorate. It aims to ensure the participation of the Institute's scientists in organizing research activities. The immediate control over the JINR activity is exercised by the Directorate.



On 1 February 1957, JINR was registered by the United Nations.

On 24 September 1997, UNESCO and JINR signed an Agreement on Cooperation in Paris. Based on the agreement, the Institute became one of the international intergovernmental organizations associated with UNESCO.



MISSION AND GOALS

The Institute was established with the aim of uniting the efforts, scientific and material potential of its Member States for investigation of the fundamental properties of matter. Over almost 70 years, JINR has conducted a wide range of research and trained highly qualified scientific personnel for the Member States.

To successfully develop as a multidisciplinary international centre for fundamental studies in nuclear physics and related fields of science and technology, the Institute will make efficient use of its theoretical and experimental results as well as high technology methods and applied research in industrial, medical, and other types of technical advancements. The Institute's development strategy is detailed in the Seven-Year Plan for the Development of JINR.

INTERNATIONAL DIALOGUE FOR SCIENTIFIC  
INTEGRATION AND SCIENCE DIPLOMACY

SOFIA DECLARATION

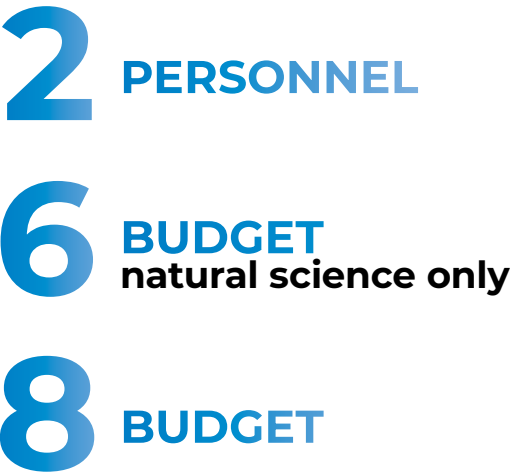
The Declaration highlights the value of international scientific and technological integration in solving the tasks of strengthening peace, fostering mutual understanding, and facilitating socio-economic progress of all the countries. The document was adopted on 22 November 2021, at the session of the Committee of Plenipotentiaries of the Governments of the JINR Member States held in Bulgaria.



Full  
text

JINR'S RANK  
among  
International  
Intergovernmental  
Research Organizations

The list of international intergovernmental research organizations is received from the open database of the Yearbook of International Organizations. Information on budget and personnel is taken from the organizations' annual reports.





JINR FLAGSHIP PROJECTS

NICA: Nuclotron-based Ion Collider fAcility

SEARCH FOR NEW STATES OF NUCLEAR MATTER

Megascience project for research into the critical states of nuclear matter under extreme conditions, which occurred after the Big Bang at early stages of the Universe's evolution using high-intensity heavy ion beams.



nica.jinr.ru

NICA covers an energy range where most important and interesting physics phenomena occurs: transition from hadronic to partonic effect dominance, possible appearance of first order phase transition in QCD phase diagram, transition from baryon to meson dominance in particle production.

NICA PARAMETERS

Range of nuclei: from hydrogen to bismuth, including gold

Extracted beams: energy — up to 4.5 GeV/nucleon intensity —  $5 \cdot 10^8 \text{ s}^{-1}$  for heavy ions  $10^{10} \text{ s}^{-1}$  for protons

Design luminosity:  $10^{27} \text{ cm}^{-2} \text{ s}^{-1}$  for heavy ions  $10^{32} \text{ cm}^{-2} \text{ s}^{-1}$  for light nuclei and polarised protons as well as deuterons



APPLIED RESEARCH INFRASTRUCTURE FOR ADVANCED DEVELOPMENTS AT NICA FACILITY

Channels for transporting charged particle beams and irradiation stations are being developed and put into operation at NICA:

SOChI: Station Of Chip Irradiation (already working),

ISCRA: Irradiation Station of Components of Radioelectronic Apparatus,

SIMBO: Station of Investigation of Medico-Biological Objects,

SHINE: Station of High Energy Investigation in Nuclear Energetics.

They are designed for research in life sciences, radiation materials science, radiation resistance of electronics, and the development of advanced technologies for nuclear power problems.



The NICA Accelerator Complex is a project allowing young specialists to join an ambitious scientific challenge. This unique research infrastructure is a magnet for talented youth from all the regions of the country JINR is based in, Russia, and other countries of the world.

The NICA Project provides young people with a great opportunity to build successful careers in science and make the most of their potential, as members of the multinational team working at the forefront of science.

100%

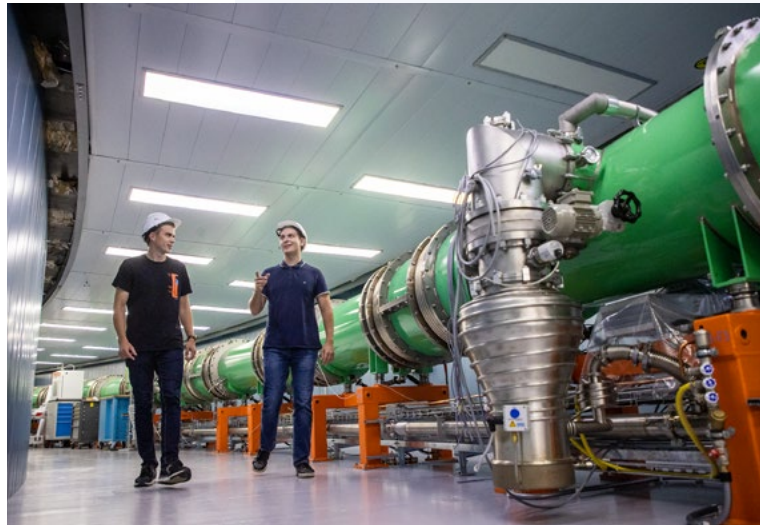
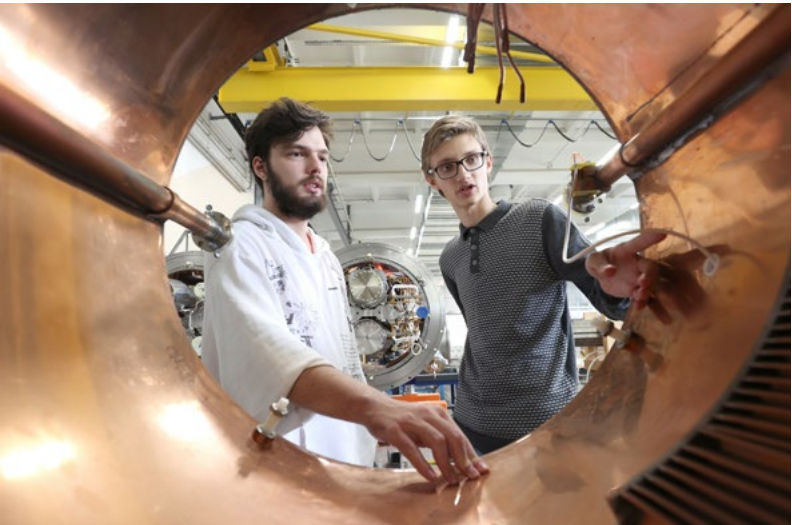
of dipole and quadrupole magnets manufactured and tested for the project

99%

capital construction

88%

overall project progress



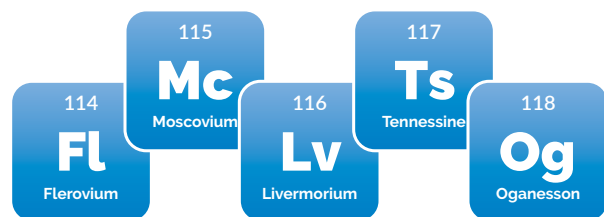


## JINR FLAGSHIP PROJECTS

### Synthesis of superheavy elements

**JINR conducts advanced experiments on the synthesis of new superheavy elements.**

The scientific programme includes experiments on the study of nuclear and chemical properties of new superheavy elements, reactions of fission, fusion, and multinucleon transfer in heavy ion collisions.



**5 NEW** superheavy elements have been discovered at JINR that conclude period 7 of the Periodic Table for the past **25 years**

One of the results of global importance achieved by JINR scientists is the experimental proof of the existence of the “island of stability” of superheavy elements centred near  $Z=114$  and  $N=184$ .

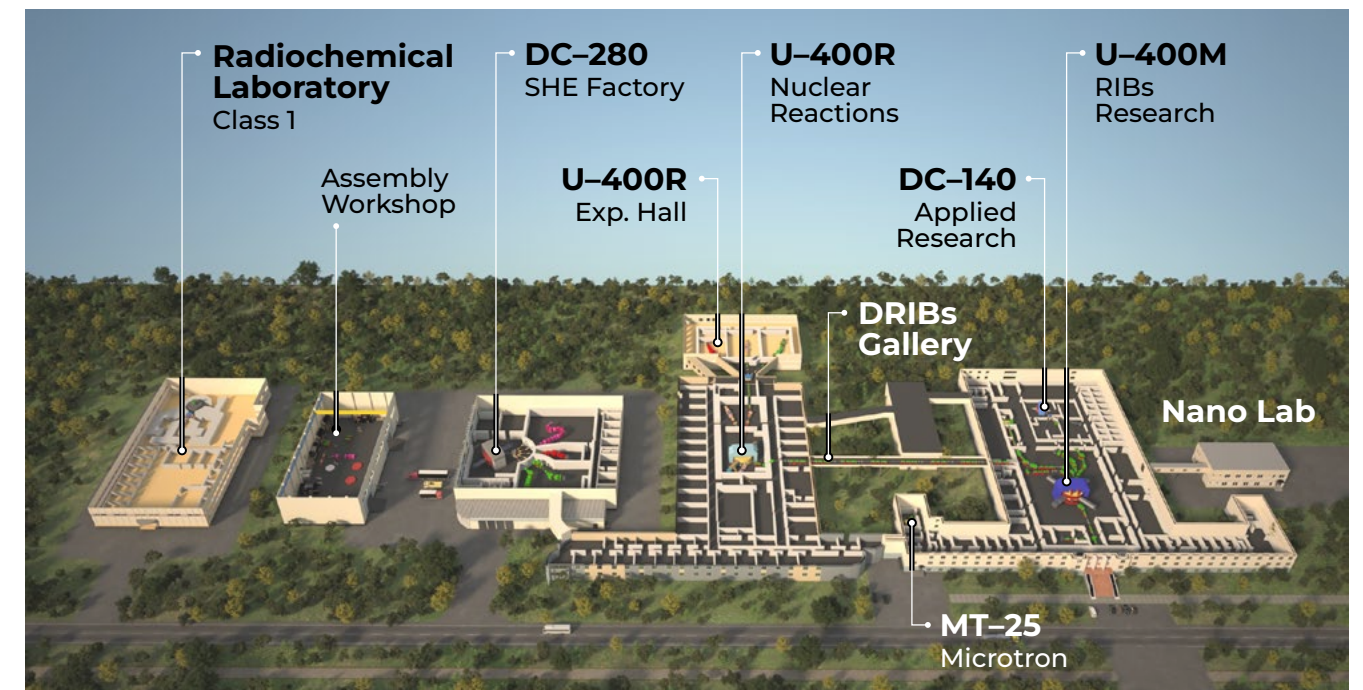
In November 2021, FLNR JINR Scientific Leader **Yuri OGANESSIAN**, after whom new, 118th, element was named for his pioneering contributions to transactinide elements research, was awarded the UNESCO–Russia Mendeleev International Prize in the Basic Sciences “to acknowledge his breakthrough discoveries extending the Periodic Table and for his promotion of the basic sciences for development at the global scale”.

#### AT PRESENT

The development of works on the synthesis and study of the properties of superheavy elements is associated with the creation of a new accelerator complex called the Superheavy Element Factory (SHE Factory) based on the DC-280 Cyclotron. The key task of the complex is to enable scientists to synthesise new chemical elements with atomic numbers 119, 120, and beyond, as well as to study in detail the nuclear and chemical properties of the earlier synthesised superheavy elements.

Record parameters of accelerated heavy ion beams have been achieved at the accelerator complex of the Superheavy Element Factory. The  $^{48}\text{Ca}$  beam intensity exceeds  $8\text{ pμA}$ . The  $^{40}\text{Ar}$  beam at the SHE Factory has reached its design intensity of  $10\text{ pμA}$ .

The scientific infrastructure of the SHE Factory is gradually improving. In addition, the U-400 and U-400M Accelerators are developing, a new facility for applied research in track membranes and materials science, DC-140, is under construction.



BASIC FACILITY — DRIBs-III ACCELERATOR COMPLEX

### SUPERHEAVY ELEMENT Factory

**SUMMARY OF EXPERIMENTS:**  
2020–2025

#### Strategic research directions:

- Heavy and superheavy nuclei
- Light exotic nuclei
- Radiation effects and nanotechnologies
- Accelerator technologies

**~250** new events of synthesis of superheavy nuclides

**~50** isotopes' decays were studied

**VS**

**~100 events**  
at all the facilities in the world, including in Dubna, since 1999

**8 new isotopes were discovered:**  
 $^{288}\text{Lv}$ ,  $^{289}\text{Lv}$ ,  $^{286}\text{Mc}$ ,  $^{276}\text{Ds}$ ,  
 $^{275}\text{Ds}$ ,  $^{272}\text{Hs}$ ,  $^{268}\text{Sg}$ ,  $^{264}\text{Lr}$

**New properties of superheavy nuclei, channels of their formation, and modes of radioactive decay**

**Test of target stability up to  $8\text{ pμA } ^{48}\text{Ca}$**





JINR FLAGSHIP PROJECTS

Baikal-GVD

Baikal-GVD — deep underwater cubic-kilometre neutrino telescope — is an international megascience project in neutrino physics and astrophysics.

The Baikal-GVD Neutrino Telescope is located in Lake Baikal 3.6 km away from the shore, at a depth of about 1300 m. Baikal-GVD is the largest in the Northern Hemisphere and the second in size in the world.

The task of the Baikal-GVD Project: identification of astrophysical sources of ultra-high energy neutrinos (exceeding tens of TeV).

Topicality: their sources are still unknown. The identification of sources will help elucidate the mechanisms of galaxies' creation and evolution. This unique scientific facility is an important tool of multi-messenger astronomy, a new powerful method to investigate the Universe.

Baikal-GVD is one of the three neutrino telescopes across the world and, along with IceCube at the South Pole and KM3NeT (former ANTARES) in the Mediterranean Sea, is part of the Global Neutrino Network (GNN).

The Baikal-GVD Neutrino Telescope is being constructed by the international collaboration with a leading role of the Institute for Nuclear Research of the Russian Academy of Sciences (Moscow) and the Joint Institute for Nuclear Research.

AT PRESENT

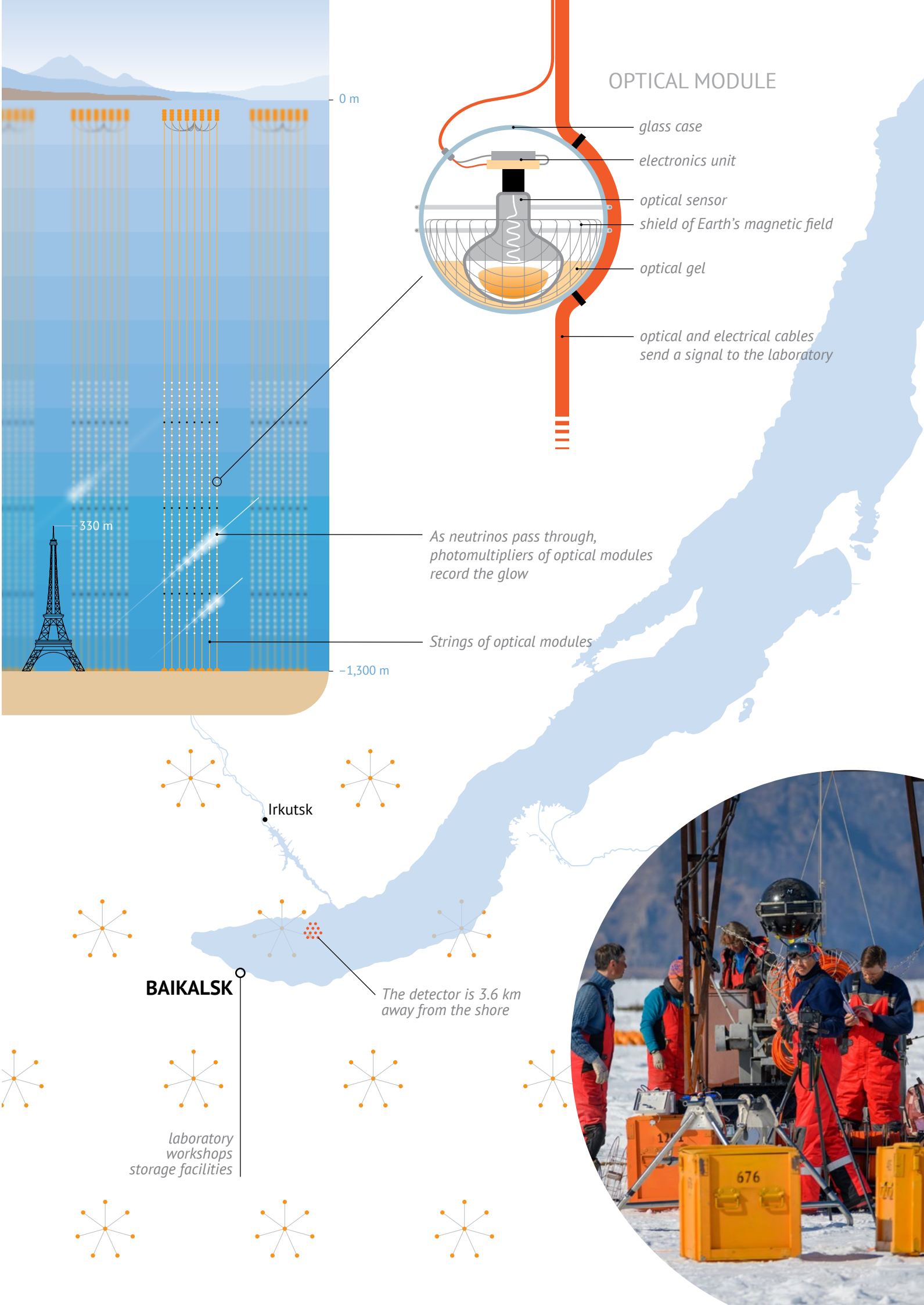
During the last Baikal expedition in 2025, the project's collaboration installed one new cluster of the neutrino telescope. All 14 installed clusters are now registering events.

INSTALLED	in 2025	total
Clusters	1	14
Optical modules	180	4284
Optical + acoustic cables, km	40	620
High-voltage bottom cables, km	0	105

According to the data collected at the Baikal deep underwater neutrino telescope from 2018 to 2023, 8 astrophysical neutrino events with reconstructed energies of above 200 TeV were registered. The distribution of the arrival directions of these events turned out to have an excess in the direction of the galactic plane with a significance of 2.1  $\sigma$ . Open data from the IceCube Telescope show an excess of neutrino flux with energies higher than predicted in the direction of the galactic plane as well.

A joint analysis of data from both facilities increases the significance level of this result to 3.6  $\sigma$ . The ultra-high energy galactic neutrino flux from the Milky Way plane turned out to be significantly greater than expected according to existing concepts, contradicting most modern models of the origin and propagation of cosmic rays.

Together, Baikal-GVD and TAIGA provide a unique multi-messenger observation of the Universe integrated into the global astroparticle network.



more than  
**60**  
& scientists  
engineers

from  
**9**  
international  
research  
centres



baikalgvd.jinr.ru



**International Intergovernmental Organization  
JOINT INSTITUTE FOR NUCLEAR RESEARCH**

6 Joliot-Curie St  
Dubna Moscow Region  
Russia 141980

[post@jinr.int](mailto:post@jinr.int)

+7 (496) 216-50-59

[www.jinr.int](http://www.jinr.int)



**JINR Press Office &  
International Communication**

To subscribe to the JINR Newsletter,  
please contact [press@jinr.int](mailto:press@jinr.int)